Human dimensions of infrastructure interdependency and resilience

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***Abstract*— In their seminal paper, Rinaldi et al. [1] describe the interdependent networks of critical infrastructure as complex adaptive systems. The complexity and adaptation arise both from interactions within the physical infrastructure and with the people who own, manage, operate, maintain, protect, regulate, design, restore, and use them. The decisions of these stakeholders influence the physical infrastructure itself as well as its capability to reliably deliver the utility products needed by the population they serve before, during, and after a natural or manmade disruptive event. Modeling and analyzing the resilience of critical infrastructure, therefore, requires consideration of these human dimensions. By adopting an agent-based approach, simulation and optimization techniques for modeling the physical infrastructure can be seamlessly integrated with dynamic models of the stakeholder decisions that influence, and are influenced by, the physical infrastructure. As an initial application of this approach, a model formulation of the interconnected electric power and natural gas systems is being developed. This presentation will detail the stakeholders, their decision-making behaviors, and the agent-based modeling approach that is focused on evaluating the adaptive, adsorptive, and recoverability capacity of the electric power and natural gas infrastructure today and into the future.**

Keywords—human dimensions; decision behaviors; infrastructure interdependency; resilience

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REFERENCES

[1] S.M. Rinaldi, J.P. Peerenboom, and T.K. Kelly, "Identifying, understanding, and analyzing critical infrastructure interdependencies," IEEE Control Systems, 21(6), pp.11-25, 2001.